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EXAMINER	
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ART UNIT	**PAPER NUMBER**
1637	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/735,395	GRUBER ET AL.	
	Examiner	Art Unit	
	Stephanie K. Mummert, Ph.D.	1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,13,18,57,61,87,88,103,112,130 and 149* is/are pending in the application.

4a) Of the above claim(s) *103,130 and 149* is/are withdrawn from consideration.

5)☒ Claim(s) *57 and 61* is/are allowed.

6)☒ Claim(s) *1,13,18,87,88 and 112* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/20/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendment filed on August 27, 2007 is acknowledged and has been entered. Claims 1, 57, 87, 88 and 112 are currently amended. Claims 2-12, 14-17, 19-56, 58-60, 62-86, 89-102, 104-111, 113-129, 131-148, and 150-157 have been canceled. Claims 1, 13, 18, 57, 61, 87-88, 103, 112, 130, 149 are pending. Claims 103, 130 and 149 are withdrawn from consideration as being drawn to a non-elected invention.

It is noted that Applicant has omitted cancelled claims 113-129 from the listing of claims. However, as these claims have been previously canceled by a preliminary amendment filed December 12, 2003, these claims are being treated as canceled.

Claims 1, 13, 18, 57, 61, 87-88, 112 are discussed in this Office action.

All of the amendments and arguments have been thoroughly reviewed and considered but are not found persuasive for the reasons discussed below. Any rejection not reiterated in this action has been withdrawn as being obviated by the amendment of the claims. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

This action is made FINAL as necessitated by Amendment.

Previous Grounds of Rejection

The rejection of claims 1, 13, 18, 57, 61 and 87 under 35 U.S.C. 102 as being anticipated by Holmlin are withdrawn in view of Applicant's amendment to the claims. The rejection of claims 1, 87-88 and 112 as being anticipated by Grier (US Patent 6,055,106) are withdrawn in view of Applicant's amendment to the claims.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on June 20, 2007 was filed in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

New Grounds of Rejection necessitated by amendment

Claim Rejections - 35 USC § 102

1. Claims 1, 87-88 and 112 are rejected under 35 U.S.C. 102(e) as being anticipated by Grier et al. (US Patent 6,416,190; July 2002). Grier teaches an apparatus and method for manipulating particles using optical traps (Abstract).

With regard to claim 1, Grier teaches a method of configuring and tracking an array of probes comprising:

a) generating at least two independently movable optical traps within a vessel (col. 7, line 6 to col. 8, line 12; see especially col. 8, lines 5-12, where an array of optical traps are used to trap

particles that are able to be manipulated individually, indicating the ability to independently move for the particles);

b) providing at least two probes within the vessel (col. 7, lines 6-20, where the filling of the optical traps with particles, or probes, is described in detail; Figure 9, where there are more than 2 probes or particles trapped in the array);

c) selecting at least two of the probes for inclusion in an array of probes contained within the optical traps (col. 7, lines 6-20, where the filling of the optical traps with particles, or probes, is described in detail; Figure 9, where there are more than 2 probes or particles trapped in the array);

d) trapping each of the selected probes with a corresponding one of the optical traps to configure the array of probes contained within the optical traps (col. 7, lines 6-20, where the filling of the optical traps with particles, or probes, is described in detail; Figure 9); and,

e) tracking the position of at least one of the trapped probes in the array by computerized monitoring of the position of the optical trap which contains it (col. 7, line 63 to col. 8, line 12, where a personal computer is used to identify specific particles through monitoring of their position).

With regard to claim 13, Grier teaches an embodiment of claim 1, wherein the trapped probe is a chemical compound (col. 2, lines 44-48, where the material trapped is mechanical, chemical or biological).

With regard to claim 18, Grier teaches an embodiment of claim 1 wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a

microorganism, a peptide, cDNA, RNA or combinations thereof (col. 2, lines 44-48, where the material trapped is mechanical, chemical or biological; col. 12, lines 31-34, where an example of a trapped biological is a chloroplast which comprises a cellular organelle).

With regard to claim 87, Grier teaches a method of configuring an array of probes comprising:

a) generating at least two independently movable optical traps within a vessel (col. 7, line 6 to col. 8, line 12; see especially col. 8, lines 5-12, where an array of optical traps are used to trap particles that are able to be manipulated individually, indicating the ability to independently move for the particles);

b) providing at least two probes within the vessel (col. 7, lines 6-20, where the filling of the optical traps with particles, or probes, is described in detail; Figure 9, where there are more than 2 probes or particles trapped in the array); and,

c) configuring an array of at least two probes by selecting each probe with a corresponding one of the optical traps (col. 7, line 6 to col. 8, line 12; see especially col. 8, lines 5-12, where an array of optical traps are used to trap particles that are able to be manipulated individually, indicating the ability to independently move for the particles);

wherein said array is modifiable by removing or adding at least one probe in said array (col. 7, lines 44-50, where the optical traps can be used to 'remove or add particles at various optical trap sites').

With regard to claim 88, Grier teaches a method of configuring and reconfiguring an array of probes comprising:

a) directing a focused beam of light at a phase patterning optical element to form a plurality of beamlets emanating from the phase patterning optical element (col. 4, lines 52-65);

b) directing the plurality of beamlets at the back aperture of a focusing lens to pass the beamlets through the focusing lens and converge the beamlets emanating from the focusing lens to generate independently movable optical traps within a vessel (col. 5, lines 22-30, where a focusing optical element converges the beams);

c) providing a plurality of probes within the vessel (col. 7, lines 6-20, where the filling of the optical traps with particles, or probes, is described in detail; Figure 9, where there are a plurality of probes or particles trapped in the array);

d) selecting at least two of the probes for inclusion in the array of probes contained within the optical traps (col. 7, lines 6-20, where the filling of the optical traps with particles, or probes, is described in detail; Figure 9, where there are more than 2 probes or particles trapped in the array);

e) trapping each of the selected probes with a corresponding one of the optical traps to configure the array of probes contained within the optical traps (col. 7, line 6 to col. 8, line 12; see especially col. 8, lines 5-12, where an array of optical traps are used to trap particles that are able to be manipulated individually, indicating the ability to independently move for the particles); and,

f) altering the position of at least one of the probes contained within the array by moving the optical trap containing the probe to reconfigure the array of probes contained within the optical traps (col. 7, lines 44-60, where the optical traps can be moved).

With regard to claim 112, Grier teaches an embodiment of claim 1, wherein the movement of the trapped probes are tracked based on pre-determined movement of each optical trap caused by encoding the phase patterning optical element (col. 7, line 63 to col. 8, line 12, where the hologram is computer designed and provides a pattern of phase modulations).

Claim Rejections - 35 USC § 103

2. Claims 1, 88 and 112 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grier et al. (US Patent 6,055,106; April 2000) in view of Visscher et al. (IEEE Journal of Selected Topics in Quantum Electronics, 1996, vol. 2, p. 1066-1076). Grier teaches an apparatus and method for manipulating particles using optical traps (Abstract).

With regard to claim 1, Grier teaches a method of configuring and tracking an array of probes comprising:

a) generating at least two independently movable optical traps within a vessel (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 5, lines 12-18, where it is noted that the optical tweezer system can be used to actively move particles relative to one another);

b) providing at least two probes within the vessel (col. 1, lines 9-18, where the method is directed to trapping small dielectric particles or other materials, and col. 1, lines 48-57, where it is noted that an object of the invention includes chemical and biosensor arrays, facilitation of combinatorial chemistry applications and manipulation of biological materials);

c) selecting at least two of the probes for inclusion in an array of probes contained within the optical traps (col. 1, lines 24-47, where the method is directed to the generation of a plurality of

optical traps; col. 1, lines 62-66, where the method is directed to the construction of a spatial array of optical traps for manipulation of particles);

d) trapping each of the selected probes with a corresponding one of the optical traps to configure the array of probes contained within the optical traps (col. 4, lines 29-30 and lines 58-65, where embodiments of arbitrary arrays of trapped particles are described; Figure 7, where a 4x4 array of beams is used to trap sixteen silica spheres in sixteen optical tweezers); and,

e) tracking the position of at least one of the trapped probes in the array by monitoring the position of the optical trap which contains it (col. 2, lines 41-45, where an object of the invention is to create multiple independently steered optical traps; col. 5, lines 38-52).

With regard to claim 88, Grier teaches a method of configuring and reconfiguring an array of probes comprising:

a) directing a focused beam of light at a phase patterning optical element to form a plurality of beamlets emanating from the phase patterning optical element (col. 4, lines 29-65, specifically lines 29-42, where light passes through a diffractive optical element and a plurality of beams are created);

b) directing the plurality of beamlets at the back aperture of a focusing lens to pass the beamlets through the focusing lens and converge the beamlets emanating from the focusing lens to generate independently movable optical traps within a vessel (col. 3, lines 36-40, where one or more beams of light are projected into the center of a back aperture; col. 4, line 66 to col. 5, line 7);

c) providing a plurality of probes within the vessel (col. 1, lines 9-18, where the method is directed to trapping small dielectric particles or other materials, and col. 1, lnes 48-57, where it is

noted that an object of the invention includes chemical and biosensor arrays, facilitation of combinatorial chemistry applications and manipulation of biological materials);

d) selecting at least two of the probes for inclusion in the array of probes contained within the optical traps (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 1, lines 62-66, where the method is directed to the construction of a spatial array of optical traps for manipulation of particles);

e) trapping each of the selected probes with a corresponding one of the optical traps to configure the array of probes contained within the optical traps (col. 4, lines 29-30 and lines 58-65, where embodiments of arbitrary arrays of trapped particles are described; Figure 7, where a 4x4 array of beams is used to trap sixteen silica spheres in sixteen optical tweezers); and,

f) altering the position of at least one of the probes contained within the array by moving the optical trap containing the probe to reconfigure the array of probes contained within the optical traps (col. 5, lines 12-18, where it is noted that the optical tweezer system can be used to actively move particles relative to one another).

With regard to claim 112, Grier teaches an embodiment of claim 1, wherein the movement of the trapped probes are tracked based on pre-determined movement of each optical trap caused by encoding the phase patterning optical element (col. 2, lines 41-45, where an object of the invention is to create multiple independently steered optical traps; col. 5, lines 38-52).

Regarding claim 1, Grier does not teach using computerized monitoring of the positions of the optical traps. Regarding claim 88, Grier does not teach tracking a position of at least one of the trapped probes in the array by computerized monitoring of the position of the optical trap

that contains it. Visccher teaches an overview of the construction of multiple-beam optical traps and includes different methods of monitoring (Abstract).

With regard to claim 1, Visccher teaches tracking a position of at least one optical trap by computerized monitoring (p. 1066, col. 1; p. 1070-1073, where position detection options are discussed; p. 1071, col. 1, where the position detection is described in detail).

With regard to claim 88, Visccher teaches tracking a position of at least one of the trapped probes in the array by computerized monitoring of the position of the optical trap which contains it (p. 1066, col. 1; p. 1070-1073, where position detection options are discussed; p. 1071, col. 1, where the position detection is described in detail).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to have adjusted the teachings of Grier to incorporate the computerized monitoring of Visscher to arrive at the claimed invention with a reasonable expectation for success. As taught by Visccher, "sensitive position detectors for objects trapped by the system are required. A wide temporal bandwith is desirable for such detectors (>10 kHz), especially for calibration of optical trap stiffness)" (p. 1066, col. 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have adjusted the teachings of Grier to incorporate the computerized monitoring of Visscher to arrive at the claimed invention with a reasonable expectation for success.

3. Claims 13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grier et al. (US Patent 6,055,106; April 2000) in view of Visscher et al. (IEEE Journal of Selected Topics in Quantum Electronics, 1996, vol. 2, p. 1066-1076) as applied to claims 1, 88 and 112 above

and further in view of Ulmer et al. (US Patent 6,055,106; April 2000). Grier teaches an apparatus and method for manipulating particles using optical traps (Abstract).

Regarding claims 13 and 18, Grier does not explicitly teach that the trapped probe is a chemical compound or biological molecule such as an oligonucleotide, protein or cell.

With regard to claim 13, Ulmer teaches an embodiment of claim 1, wherein the trapped probe is a chemical compound (col. 4, lines 15-24, where each trapped probe can be a different chemical or biological or biochemical compound or agent).

With regard to claim 18, Ulmer teaches an embodiment of claim 1 wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, RNA or combinations thereof (col. 7, lines 28-35, where the trapped probe is an oligonucleotide or nucleic acid fragment).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Ulmer into the method of optical trapping taught by Grier to arrive at the claimed invention with a reasonable expectation for success. Ulmer discloses the use of optical traps in methods of biological, biochemical or chemical processes. As taught by Ulmer, "Examples of chemical, biochemical and/or biological processes that might be implemented in accordance with the invention include the following: oligonucleotide synthesis and sequencing, carbohydrate synthesis and sequencing, combinatorial library synthesis and screening, conventional (i.e., Sanger or Maxam-Gilbert) DNA sequencing, or single-molecule DNA sequencing" (Abstract). In fact, it is also a directly stated object of Grier to "provide an improved method and system for establishing a plurality of optical traps for

a variety of commercial applications relating to manipulation of small particles" and this includes chemical and biochemical sensor arrays, facilitation of combinatorial chemistry applications and the manipulation of biological materials (col. 1, lines 48-57). Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to extend the arrays of optical traps taught by Grier to include the specific types of biological targets and probes taught by Ulmer to achieve the manipulation of biological targets as described generally by Grier with a reasonable expectation for success.

Response to Arguments

4. Applicant's arguments with respect to claims 1, 13, 18, 57, 61, 87-88, 112 have been considered but are moot in view of the new ground(s) of rejection. The arguments are focused on the claims as amended, which required the new grounds of rejection.

Conclusion

No claims are allowed.

Claims 57 and 61 are free of the prior art. The prior art does not teach or suggest the segregation of targets that react with probes away from the remaining probes. A survey of the art shows a teaching of this technique, however these references do not have priority back to a date that is prior to the priority claim of the instantly filed application. Therefore, these claims are free of the prior art.

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephanie K. Mummert, Ph.D. whose telephone number is 571-272-8503. The examiner can normally be reached on M-F, 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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